December 2023 International Society of Sugar Cane Technologists Founded 1924 Bulletin

Welcome to the ISSCT Bulletin for December 2023, in which we collect latest ISSCT updates, along with news, research, and past and upcoming events related to sugar cane technology.

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ISSCT News

An update on the preparations for the ISSCT XXXII Centennial Congress, Colombia 2025

The global sugarcane sector in Colombia is busy preparing for one of the industry's biggest events ever, the ISSCT XXXII Centennial Congress 2025, to be held in the city of Cali, Colombia. The Colombian Association of Sugar Cane Technologists (TECNICAÑA), in partnership with CENICAÑA and ASOCAÑA and the Congress Organising Committee, have been working hard to ensure that the Centennial Congress will be a great success.

Since the announcement at the last ISSCT XXXI Congress in 2023 in Hyderabad, India that the city of Cali in Colombia would host the Centennial Congress, TECNICAÑA has organised various promotional activities to be implemented during the coming months. Several meetings have been held by the Congress Organizing Committee, composed of directors ASOCAÑA, CENICAÑA and TECNICAÑA, as well as sugarcane producers and former executive members of ISSCT. The Congress Organising Committee is addressing a wide range of issues essential for ensuring an unforgettable experience for all participants.

In order to generate interest and excitement around the upcoming Congress and increase global reach, a short video campaign of Instagram reels (https://bit.ly/3tcxouY) was launched on social media and in TECNICAÑA's communication channels, capturing the spirit of the Congress and its historic importance for the sector. This short-form audiovisual content has been instrumental in creating a sense of growing anticipation for this key event while also addressing the themes chosen for this Centennial Congress.

The Congress Organising Committee has also published two Newsletters (https://bit.ly/47IBGJR) this year which are a source of information on the progress being made for the preparations of the upcoming Congress, the key issues to be addressed and contain important logistical information for attendees. The ISSCT Centennial Congress 2025 promises to be a significant milestone for the global sugarcane industry worldwide. We look forward to welcoming you in

Colombia, at the Pre-Congress Tour from 22 to 23 August, where you can obtain first-hand information about the state-of-the-art technologies that make Colombia one of the world's most productive countries in the sugarcane industry, at the Congress itself from 24 to 28 August and at the Post-Congress Tour from 30 to 31 August 2025.

You are welcomed to be part in the academic agenda by sending your proposals for papers and posters to ISSCT for consideration and have the opportunity to present them at the Congress. Proposals should be sent to the following email addresses: issct.editor@bigpond.com and peter.allsopp0351@gmail.com.

Deadline for submissions of paper and poster proposals is 30 August 2024.

Deadline for submission of complete papers and posters accepted for inclusion by the Technical Programme is 31 December 2024.

TECNICAÑA and the Congress Organising Committee are committed to making this event an exceptional experience for all involved and we reply on the support of the global sugarcane producing community to that end.

We look forward to welcoming sugarcane experts, professionals and enthusiasts to the tropical city of Cali to celebrate the achievements of ISSCT since its creation in 1924.

We send our warmest wishes for the holiday season. May this festive season be filled with joy, peace and prosperity for all members of the sugarcane community and their families.

Nicolas Gil Zapata on behalf of the Congress Organising Committee



Feature: Towards Agroecological Management of Sugarcane Pests

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Introduction

Agroecological management of sugarcane pests is set to play a key role in pest control solutions as more and more countries tend to reduce their pesticide use due to global environment concern accelerated by climate change and global warming. However, this control strategy appears more complicated to implement in the field, as agroecology is based on fine knowledge of ecological processes

(e.g., pest-crop-natural enemy interactions), and of how agricultural and environmental factors influence population dynamics. Here are some examples of what could be implemented to control insect pests in sugarcane agrosystems, which cause 10 to 30% of crop losses, depending on infestation levels.

Management of Moth Borers

Erianthus arundinaceus: a trap crop for the spotted sugarcane stem borer

Using trap crops is an agroecological protection strategy for regulating populations of sugarcane stemborers. The grass Erianthus arundinaceum is a close relative of sugarcane. The females of the spotted sugarcane stem borer Chilo sacchariphagus prefer to lay their eggs on E. arundinaceum rather than on sugarcane, while the survival of the larvae on that grass is very low. Studies on Reunion Island have shown that planting a row of Erianthus around sugarcane plots reduces damage in the cane. This strategy of using trap crop can be associated with biocontrol of C. sacchariphagus using field releases of the egg parasitoid Trichogramma chilonis.

Nitrogen and silicon are key elements affecting borer infestation

Recent studies on three borer species, Eldana saccharina (Ivory Coast, Senegal, South Africa), Diatraea spp. (Argentina and Panama) and Chilo sacchariphagus (Indonesia) have shown that these pests are very sensitive to silico n and nitrogen contents in the plant. For example, using silicon-based products in our experiments significantly reduced borer damage levels by up to 50%, confirming the positive effect of silicon as a physical barrier to borer penetration. On the other hand, excessive nitrogen rates applied to the soil led to a reverse situation, attracting borer populations and increasing damage. Over-application of nitrogen is common in sugarcane growing areas and it is essential to conduct soil analyses to check nitrogen levels in the soil before applying this fertilizer. In central and eastern Africa other important pests such as Sipha flava the Yellow Sugarcane Aphid seems to react positively to nitrogen by increasing colonies in sugarcane fields and yield losses.

Knowledge of Functional Biodiversity in Cane Fields

As part of Cirad's Sustainable Territory project, data are being collected on arthropod fauna present in cane fields, thanks to two trapping devices (pitfall traps and window traps), installed on several sites in Petite-île (South of Reunion Island). Predators and parasitoids involved in the biocontrol of cane pests, including stem borers, are studied in terms of richness, abundance and functional role, in relation to cultural practices and crop diversification. Particularly the link with the reduction of arthropod number and diversity due to insecticide and herbicide applications is being studied thanks to data collected during the surveys conducted in pilot farms.





Companion Plants Around Sugarcane Fields

Conservation biocontrol is a growing solution to enhance the presence of beneficial arthropods and thus increase pest control. In Tanzania, recent studies have shown that planting the Mexican sunflower, Tithonia diversifolia significantly increased the number and diversity of natural enemies of the yellow sugarcane aphid S. flava, such as coccinelid species (ladybugs), hover flies, lacewings and many others. It also attracts species of Campsomeridae known to be parasitic wasps of white grubs. Flower strips planted in and around sugarcane fields on large estates that are generally poor in term of plant diversity can provide food resources (nectar) and shelter for beneficial arthropods such as predators and parasitoids and this will increase biocontrol of key pests.





Biocontrol of the White Grub

Tracking a myco-insecticide in the field

The persistence and diffusion of myco-insecticides in agroecosystems are poorly known. Cirad Reunion has been developed techniques to describe the genetic diversity of a commercial strain of the fungus Beauveria hoplocheli and keep track of fungus populations in the soil. This entomopathogenic fungus was introduced on Reunion Island and used throughout the sugarcane growing area for 30 years to control the white grub Hoplochelus marginalis (see photo of dead larvae developing white mycelium). The work at Cirad Reunion involves spatio- temporal monitoring of the myco-insecticide in sugarcane fields over successive sugarcane crop cycles.



Green Cane Harvesting Vs. Hand Cutting of Burnt Field

Cane field burning is a practice that is still in use in many sugar producing countries. However, it is recognised that such burning has a huge negative impact on the environment and biodiversity and contribute to accelerate global warming in producing regions. In term of pest management, the lack of beneficial insects in burning fields that are normally able to control pest populations pose a real issue. In Tanzania and other estates in Africa, actions are undertaken to reduce this practice by increasing green cane harvesting using choppers. Surveys is being conducted in pilot sites to measure the biodiversity loss (predators and parasitoids) by comparing unburnt and burnt fields and its effect on natural pest control.



Conclusion







Research activities towards agroecological practices and use of pest regulation services are being conducted in different projects worldwide and CIRAD as an international research centre on agronomy is particularly active on thematic areas in Reunion Island and Tanzania. These new initiatives in sugarcane protection aim at reducing the use of pesticides, particularly insecticides that are still in use to control some pests such as aphids, stemborers and white grubs. Climate change has also forced many sugar companies and growers to adapt their agricultural practices to mitigate the impact of global warming on productivity, hence the reduction of cane burning practice for the benefits of green cane harvesting and the preservation of functional biodiversity.

In this particular context, a new pest control paradi gm integrating more ecological methods suitable is taking place to guarantee a sustainable production, socially acceptable, economically viable in a non-polluted environment.

Feature: Potential climate change effects on crop production and adaptation strategies in sugarcane cultivation

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Flooding due to extreme weather conditions

Climate change is a global phenomenon that has far-reaching effects on our planet's ecosystems, including agriculture. The implications for crop production are substantial, as shifts in temperature, precipitation patterns, and extreme weather events pose challenges to farmers worldwide. Sugarcane production has been and expected to continuously show climate change effects (Zhao and Li 2015). Here, I explore the multifaceted impact of climate change on crop production and discusses potential strategies for adaptation in sugarcane.

Increase in Atmospheric CO_2 Concentration and Temperature Changes

Increase in CO2 concentration and its association with global warming is well documented (Houghton et al. 2001; IPCC 2014). Rising temperatures can significantly influence crop growth and development. Many crops have specific temperature requirements for optimal growth, and deviations from these norms can affect yields. Warmer temperatures may accelerate crop maturation, potentially leading to reduced yields, altered flowering times, and changes in overall crop phenology. In sugarcane, elevated CO2 concentration under controlled conditions increased photosynthesis, water use efficiency and biomass production (Vu and Allen 2009).

Altered Precipitation Patterns

Climate change is projected to alter precipitation patterns (Dhillon and Wuehlisch 2013). Changes in precipitation patterns, including more intense rainfall or prolonged droughts, can disrupt agricultural practices. Insufficient water availability during critical growth stages can lead to water stress, affecting crop health and productivity. For example, sugarcane yields are expected to decline significantly in rainfed areas of

South Caribbean (Singh and Maayar 1998) and China (Li and Wei 2006), due to water stress. Conversely, excessive rainfall can cause flooding, soil erosion, and waterlogged conditions, adversely impacting root systems. Sea level rise may disrupt sugarcane production in Australia and Florida where most of the production is along coastal areas (Chakraborty et al. 1998).



Hardev Sandhu
Drones and sensors for crop monitoring and management



Field day for variety selection

Extreme Weather Events

The increasing frequency and intensity of extreme weather events, such as hurricanes/cyclones, storms, and heatwaves, pose direct threats to crop production (Gawander 2007). These events can result in physical damage to crops, soil degradation, and the loss of entire harvests. Farmers face the challenge of adapting to unpredictable weather patterns and safeguarding their crops against such events.

Pest and Disease Dynamics:

Climate change can alter the geographic distribution and prevalence of pests and diseases. Warmer temperatures may enable the expansion of some pests into new regions, posing new challenges for farmers. Changes in rainfall patterns can also influence the prevalence of waterborne diseases and fungi, further impacting crop health.

Impact on Crop Diversity:

Climate change can influence the suitability of regions for specific crops, leading to shifts in the geographic distribution of agricultural activities. This can affect the

livelihoods of farmers who depend on specific crops and may require them to adapt by diversifying their agricultural practices or changing the types of crops they cultivate.

Potential Adaptation Strategies in sugarcane

Selecting Climate-Resilient Varieties

One key adaptation strategy is the identification and cultivation of sugarcane varieties that exhibit resilience to climate stressors. Research and breeding programs can focus on developing varieties with traits such as heat tolerance, resistance to pests and diseases, and improved water-use efficiency.

Precision Agriculture Techniques

Precision agriculture involves the use of technology, such as sensors and drones, to optimize farming practices. By using precision agriculture techniques, sugarcane farmers can enhance resource efficiency, monitor soil health, and adjust irrigation practices based on real-time weather data, contributing to more resilient and adaptive farming systems.

Improved Water Management

Changes in precipitation patterns and the increased occurrence of droughts necessitate improved water management in sugarcane cultivation. Implementing water-efficient irrigation methods, rainwater harvesting, and investing in water storage infrastructure can help ensure consistent water availability for sugarcane crops.

Agroforestry Integration

Integrating agroforestry practices within sugarcane cultivation areas can provide multiple benefits. Agroforestry systems contribute to improved soil structure, reduced erosion, and enhanced biodiversity. The presence of trees can also act as windbreaks, helping protect sugarcane crops from the damaging effects of extreme weather events.

Cover Cropping and Soil Health

Cover cropping involves planting specific crops during non-sugarcane growing seasons to protect and enhance soil fertility. This practice can reduce soil erosion, suppress weeds, and improve overall soil health. Healthy soils are more resilient to climate stressors and can contribute to sustained sugarcane productivity.

Climate-Adaptive Pest and Disease Management

As climate change alters the geographic distribution of pests and diseases, sugarcane farmers must adopt adaptive pest management strategies. Integrated and agroecological pest management, which combine biological, cultural, and chemical control methods, can help control pests and diseases while minimizing environmental impact.

Investment in Research and Extension Services

Continued investment in research and extension services is critical for disseminating knowledge about climate- resilient sugarcane cultivation practices. Farmer education programs, supported by research findings, can empower sugarcane growers to make informed decisions in the face of changing climatic conditions.

Conclusion

Understanding the intricate relationship between climate change and crop production is crucial for developing effective strategies to safeguard global food security. Climate change can impact sugarcane production in various ways. Changes in temperature and precipitation patterns may alter the optimal conditions for sugarcane growth, affecting yields. Additionally, increased frequency of extreme weather events such as hurricanes or droughts can damage crops. Shifts in pest and disease patterns due to climate change can also pose threats to sugarcane cultivation.

Adapting sugarcane cultivation to climate change is not only a necessity but an opportunity to build more sustainable and resilient agricultural systems. By embracing innovative technologies, implementing climate-smart practices, and fostering collaboration between researchers, policymakers, and farmers, the sugarcane industry can navigate the challenges posed by climate change and continue to thrive in the years to come.



Wind erosion in organic soil due to heavy winds

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In Memoriam



Dr. Mohammed G. Kawuyo
ISSCT Councillor for Nigeria and Member of ISSCT Management Commission

The sugar community in Nigeria has lost one of its finest sugarcane agronomist, expert and researcher in the person of the late Dr. Mohammed Gidado Kawuyo. Dr. Kawuyo a native of Adamawa State, North East Nigeria spent most of his productive years working as a researcher and instructor in Nigeria's sugar sub-sector until he passed away on 29 August 2023 after a brief illness.

Dr. Kawuyo who earned a degree in Agronomy from the Ahmadu Bello University, Zaria, Nigeria also obtained a PhD from the University of Ilorin. He began his career at the Savannah Sugar Company Limited (SSCL) in Numan, Adamawa where he distinguished himself as an innovative scientist and researcher.

Having spent considerable years working at SSCL where he groomed and mentored dozens of young scientists, Dr. Kawuyo later joined Nigeria's apex sugar regulatory body, the National Sugar Development Council as a Principal Project Officer, Research and Development (PPRO/R&D) in the Department of Technical Services. He grew through the rank and retired as a Chief Project Officer, Research and Development in February 2023.

While in service he, along with colleagues in the Technical Services and Policy & Planning Departments of NSDC, formulated the **Nigeria Sugar Master Plan** and was among the leading experts who implemented the plan. He was also the Desk Officer for the **West Africa Sugar Development Project**, a 5-year project involving both Nigeria and Cote d'Ivoire, which was funded by the UN Common Fund for

Commodities (CFC) and supervised by the International Sugar Organization (ISO). Upon retirement in early 2023, he was appointed the interim Coordinator, Nigeria Sugar Institute (NSI), where he worked with a team of young and brilliant scientists drawn from renowned institutions in Nigeria. Dr. Kawuyo participated in the ISSCT congresses and workshops and was Nigeria's Councillor for the ISSCT XXXII Congress held in Hyderabad, in February 2023. He was appointed a member of the ISSCT Management Commission at this Congress.

Expression of sympathy have been conveyed to Dr. Kawuyo's wife and family on behalf of ISSCT Council and Executive Committee and of the membership at large.



Sugar Cane News

ClimateCane Tracker to help cut greenhouse gas emissions in sugarcane

	Bonsucro	**November 13, 2023**	**https://bonsucro.com/climatecane-tracker-launch/**

Contributing to global climate efforts has just become easier for the sugarcane sector with the ClimateCane Tracker.

This new tool launched by Bonsucro will help sugarcane farms and mills, and buyers of sugarcane derivatives, to set targets to reduce emissions in line with climate science.

The tool was designed specifically for the sugarcane sector using the Science-Based Targets initiative's (SBTi) guidance on forest, land and agriculture (FLAG) emissions to the sugarcane sector.

World's first low-energy bioplastics developed with the University of Sheffield raises £2 million investment

	University of Sheffield	**November 21, 2023**	**https://www.sheffield.ac.uk/news/worlds-first-low-energy-bioplastics-developed-university-sheffield-raises-ps2-million-investment**

The world's first low-energy, non-oil-based, high-performance bioplastic, developed by Floreon with the University of Sheffield, has secured £2 million financing from Northern Gritstone.

Northern Gritstone, the investment business focused on university spinouts and science and technology-enabled businesses in the North of England, has today announced a £2 million Series A investment into the bioplastics developer Floreon Technology Limited ('Floreon'), a spinout technology from the University of Sheffield.

Floreon has developed a range of bioplastics made from plants, including corn and sugar cane, with performance comparable to Acrylonitrile Butadiene Styrene (ABS), the common plastic polymer widely used in automotive, electronics and electrical appliances and toys.

Harvesting Hydrogen

	Renewable Energy Magazine	**November 24, 2023**	**https://www.renewableenergymagazine.com/biofuels/accelerating-the-deployment-of-biofuels-is-crucial-20231124x**

Transport in particular is proving to be a very difficult sector to decarbonise, according to the International Energy Agency (IEA) Net Zero by 2050 roadmap, and IEA Bioenergy believes that one of the key tools to help remedy this in the short to medium term is to accelerate the deployment of sustainable biofuels.

Accelerating use of biofuels crucial to decarbonise global transport sectors says IEA Bioenergy
IEA Bioenergy is committed to advancing bioenergy technologies based on sustainable biomass feedstocks for a greener and sustainable future. With the world facing a worsening climate crisis and emerging energy security issues with fossil fuels, finding effective solutions to phase out fossil fuels in the transport sector is crucial, and IEA Bioenergy believes that biofuels offer a compelling option, in synergy with electrification.

The recently published reports from the IEA Bioenergy study "Assessment of Successes and Lessons Learned for Biofuels Deployment" highlight the potential of biofuels to drive significant market supply, replace fossil fuels, and combat global warming. The main target of the study was to identify key factors for technology successes and the best policy framework conditions for stimulating increased future markets for sustainable transport biofuels.

Extreme events driving innovation in agri-tech, REAP

conference reveals

	Cambridge Network	**November 13, 2023**	**https://www.cambridgenetwork.co.uk/news/extreme-events-driving-innovation-agri-tech-reap-conference-reveals**

The NFU Vice-President, David Exwood, and Defra's Chief Scientific Adviser, Professor Gideon Henderson, were the keynote speakers at Agri-TechE's REAP Conference 2023, which also saw presentations from early-stage companies that are addressing increasingly urgent real-world problems from a different perspective.

"Extreme events over recent years have brought the recognition that if you want to stay in business, you need to be open to change. All the companies in this year's REAP Start-Up Showcase were addressing a real-world problem that is becoming more urgent – but they are also viewing the challenge through a different lens, and this brings hope," says Dr Belinda Clarke, Director of Agri-TechE.

She comments that it was noticeable this year that farmers are working closely with innovators to co-develop farm-ready technologies: "The rising cost of labour and inputs based on fossil fuels are driving innovations that will reshape the sector."

IoT in Agritech

	BIS Infotech	**December 7, 2023**	**https://www.bisinfotech.com/big-story-iot-in-agritech/**

Integrating the Internet of Things (IoT) in Agritech has ushered in a transformative era for the farming industry. IoT innovative agriculture products are designed to help monitor crop fields using sensors and automating irrigation systems. IoT technologies have empowered farmers with unprecedented control and efficiency in their operations, allowing for precise monitoring and management of agricultural processes. Sensors deployed in the field collect real-time data on soil health, moisture levels, crop conditions and weather patterns, providing farmers with valuable insights for informed decision-making.

Automated systems driven by IoT enable remote control of irrigation, fertilisation, and pest control, optimising resource utilisation and minimising environmental impact. This connectivity enhances productivity and facilitates sustainable practices by reducing waste and conserving resources. The power of IoT in Agritech lies in its ability to revolutionise traditional farming methods, fostering a more resilient and data-driven approach to agriculture that promises increased yields, cost savings, and a more sustainable future for food production. Highlighting the same, below are the industry insights from Raj Vallabhaneni, Chief Technology Officer, Samunnati; Sat Kumar Tomer, Founder, CEO, Satyukt Analytics; Gaurav Narang, Founder, CityGreens; Ashish Agarwal, Co-Founder & CTO, WRMS.

Brazil to help India boost ethanol production

	Mint	**November 14, 2023**	**https://www.livemint.com/technology/tech-news/brazils-tech-can-help-india-reach-20-ethanol-blending-11699979180440.html**

	Brazil has started sharing technology with India to help it achieve 20% ethanol blending for petrol by 2025-2026, and will send indigenous breeds to improve productivity in the livestock and poultry sector, said Brazilian agriculture and livestock minister Carlos Favaro in an interview. Brazil is the world's second largest producer of ethanol. *Brazil will also take measures to correct some of the imbalance in the agricultural trade relationship by improving market access for Indian agriculture exports, including urea, to Brazil.*

Honeywell inks SAF partnership with GranBio

	Ethanol Producer Magazine	**November 8, 2023**	**https://ethanolproducer.com/articles/harvesting-hydrogen**
	The largest ethanol producer in Brazil has teamed up with a hydrogen technology company, along with others, to build what is believed to be the world's first ethanol-to-hydrogen fueling station. Located on Brazil's University of Sao Paulo campus, by mid-year the pilot plant will begin fueling three buses and a car powered by hydrogen fuel cells. Planning is also underway for a 10-fold scale-up to serve as a demonstration of how the technology could be used in an industrial facility. *Raízen and Hytron are behind the project, with several other entities supporting it. The Brazilian National Agency of Petroleum, Natural Gas and Biofuels (ANP) is involved as is the University of Sao Paulo's Research Center for Greenhouse Gases Innovation, which will validate costs and emissions. The SENAI Institute for Innovation in Biosynthetic and Fibers will conduct computer simulations to optimize the process. And Toyota is provid-ing a Mirai hydrogen fuel cell vehicle to the project, which is being funded through a R$50 million investment by Shell Brasil, in compliance with the RD&I clause established by ANP.*		

Review article shows key role of Brazil in research on sugarcane for bioenergy [Brazil]

	Phys.org	**November 27, 2023**	**https://phys.org/news/2023-11-article-key-role-brazil-sugarcane.html**
	Publications on sugar cane have increased exponentially since 2006 worldwide, and Brazil has had more articles published on the topic than any other country in the period, according to a review in BioEnergy Research. *The number of articles on the subject averaged about five per year between 1999 and 2006, but had reached 327 by 2021. Brazil has twice as many articles on sugar cane as the United States, which ranks first in the world for scientific publications in general. Brazil is also ahead of Australia, China and India, which are also major sugar cane growers.* *According to the authors of the review, who are affiliated with the Laboratory of Plant Physiological Ecology (LAFIECO) at the University of São Paulo's Institute of Biosciences (IB-USP), these statistics highlight Brazil's importance to global sustainability efforts.*		

Syngenta Launches Biological Nematicide for the Entire Sugarcane Cycle in Brazil

	Agribusiness Global	**December 4, 2023**	**https://www.agribusinessglobal.com/markets/syngenta-launches-biological-nematicide-for-the-entire-sugarcane-cycle-in-brazil/**
	After the development and dozens of experimental tests carried out in sugarcane fields in various regions of Brazil, Syngenta launched the microbiological bionematicide CERTANO. The new technology is the company's first biological aimed at sugarcane cultivation and arrives with effect: bionematicide, biofungicide and growth-promoting action that offers consistent control with immediate and prolonged effect. *Aimed at the entire sugarcane crop cycle, the product promotes effective control of different genera of entomopathogenic nematodes present in sugarcane fields, which considerably impact the productivity of the entire sugarcane crop.*		

Sugarcane byproduct pressmud can be a sweet spot for India's compressed biogas sector [India]

	Down to Earth	**November 28, 2023**	**https://www.downtoearth.org.in/news/renewable-energy/sugarcane-byproduct-pressmud-can-be-a-sweet-spot-for-india-s-compressed-biogas-sector-93022**
	India has assumed a key position in the worldwide sugar economy, emerging as the foremost sugar producer since 2021-22, surpassing Brazil. Additionally, it stands as the second-largest sugar exporter globally. The expansion of the ethanol biofuel sector over the past five years has not only strengthened the sugar industry but also contributed to the improved financial standing of sugar mills. *Pressmud, a residual byproduct in the sugar industry often known as filter cake or press cake, has been acknowledged as a valuable resource for green energy production. The byproduct can help Indian sugar mills generate extra revenue by utilising it as a feedstock for biogas production through anaerobic digestion and subsequent purification to create compressed biogas (CBG).* *Usually, the yield of pressmud falls within the range of 3-4 per cent weight by weight with the input sugarcane processed in a unit.*		

AFA to spend Sh600m on sugar industry upgrade [Kenya]

	People Daily	**December 7, 2023**	**https://punchng.com/reforms-in-sugar-industry-will-boost-economy-dangote-**

			sugar-ceo/
	The Agriculture and Food Authority (AFA) will spend Sh600 million to facilitate research into fast maturing sugarcane varieties starting this financial year, to enhance production. *This comes amid concerns that it was taking more than 20 months for cane to mature in Western Kenya sugar belt while at the Coast belt, it only took 11 months.* *AFA Director General Jude Chesire disclosed this during the 2nd Annual Sugar Innovation Symposium in Kisumu. "There are echoing concerns about sugarcane variety, with farmers claiming the current sugarcane variety took too long to mature in the farms," he claimed.*		

Amid socioeconomic slump, new sugar cane varieties offer hope in Sri Lanka

MONGABAY	**Agriulture Post**	**October 25, 2023**	https://news.mongabay.com/2023/10/amid-socioeconomic-slump-new-sugar-cane-varieties-offer-hope-in-sri-lanka/
	Lauding the strides made in digitising agriculture and harnessing technological innovations, which have been central priorities during India's G20 presidency this year, India's G20 Sherpa, Amitabh Kant, underscored the significance of digitisation in agriculture in bringing the next big green revolution and transforming the agriculture sector into a data-driven, adaptive system that can effectively combat challenges of climate change. *Kant was speaking at the G20 India Agritech Summit 2023 held on Monday in Delhi. The Summit showcased India's commitment to driving innovation, collaboration and sustainability in the realm of agriculture. The Summit, hosted as part of India's G20 Presidency, brought together thought leaders, experts and stakeholders from across the globe to explore transformative solutions for the future of farming.*		

Gov't rolls out incentive for green sugarcane farming [Thailand]

Pattaya Mail	**Pattaya Mail**	**December 7, 2023**	https://www.pattayamail.com/thailandnews/govt-rolls-out-incentive-for-green-sugarcane-farming-447155
	The government has launched an 8 billion baht campaign to promote eco-friendly sugarcane farming, targeting the reduction of harmful PM2.5 dust particles during the 2022/23 harvest year. *Deputy Government Spokesperson Rudklao Suwankiri said on Monday that the program, funded by the state-owned Bank for Agricultural and Agricultural Cooperatives, rewards farmers with 120 baht per ton for harvesting sugarcane without burning the residue. This policy is part of a broader strategy to combat the issue of crop residue burning, a significant contributor to air pollution.*		

Virgin Atlantic wins UK permit for 100% sustainable fuel transatlantic flight [UK]

	Reuters	**November 6, 2023**	**https://www.reuters.com/sustainability/climate-energy/virgin-atlantic-fly-transatlantic-with-100-sustainable-fuel-2023-11-06/**
	Virgin Atlantic will fly from London to New York on Nov. 28 using 100% sustainable aviation fuel (SAF), after Britain gave it permission, paving the way for a world first as airlines step up efforts to decarbonise travel. *Airlines are pinning their hopes on SAF, which uses waste such as cooking oils to reduce emissions by up to 70% compared to fossil fuels, to decarbonise flying before new electric and hydrogen-powered options expected in the coming decades.*		

Gasification technology contract for SAF facility awarded to NextChem [USA]

	Waste Today	**December 7, 2023**	**https://www.wastetodaymagazine.com/news/gasification-technology-contract-for-sustainable-aviation-fuel-facility-awarded-to-nextchem/**
	NextChem, a Marie Tecnimont company, through its subsidiary My Rechemical, has been selected by DG Fuels Louisiana to provide its gasification technology for a sustainable aviation fuel (SAF) facility under development in St. James Parish, Louisiana. *The facility, expected to be operational by 2028, will produce 350,000 tons per year of SAF derived from biomasses and waste resources. MyRechemical has been selected as a technology licensor for a gasification unit and a gas treatment unit able to process one million tons per year of bagasse and sugar cane trash and pulp, representing the first step for SAF production.*		

Latest Research

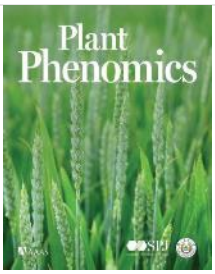
A Combined Genomics and Phenomics Approach is Needed to Boost Breeding in Sugarcane

Sugarcane is a major food and bioenergy crop globally. It produces ~80% of sugar

consumed worldwide, with Brazil and India together accounting for 61% of world sugarcane production in 2021 [1]. Globally, sugarcane is the 5th largest crop by production value and acreage, and it is also the second largest bioenergy crop [1,2]. Modern sugarcane is an interspecific hybrid (Saccharum species hybrid) of wild progenitor species Saccharum officinarum (2n = 80; x = 10) and Saccharum spontaneum (2n = 40 to 130; x = 8) [3]. This genetically complex polyploid crop with varied chromosome numbers (100 to 130) has one of the largest genomes (~10 kb) among plants, making sugarcane breeding considerably slow and challenging.

Published: July 14, 2023

> **Link**

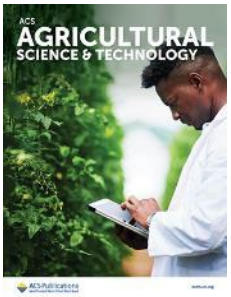


Early Detection Cold Markers to Expedite the Sugarcane (Saccharum spp. Hybrids) Breeding

Sugarcane breeding is a lengthy (>10 years) and expensive multilocational effort. Targeted breeding for cold tolerance is particularly challenging under the subtropical climate, where a damaging freeze does not happen every year. This study aimed to develop chemical markers to detect cold tolerance in genotypes, before freeze happens, to expedite the sugarcane breeding. High sucrose and low invert sugars (glucose and fructose) were used as the benchmark chemical traits for cold tolerance. The tolerant variety HoCP04-838 maintained low invert sugars throughout the subfreeze temperatures (inducing stalk cracking) and subsequent temperature increases to >20 °C (enhancing juice deterioration). A tyrosine-like fluorescent marker distinguished HoCP04-838 from susceptible varieties including L12-201 and Ho12-615 ($p < 0.05$). In addition, HoCP04-838 contained the highest trans-aconitic acid in juice before the freeze, and the cultivar rankings persisted after the freeze. Developed markers could offer a rapid method to screen parents and progeny populations for diverse environmental stressors beyond freeze.

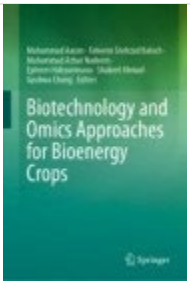
Published: December 4, 2023

> **Link**



Advanced and Sustainable Approaches in Sugarcane Crop Improvements with Reference to Environmental Stresses

Sugarcane is an important crop for the production of sugar, biofuels, and other value-added products. However, traditional breeding methods have limitations due to the complex genetics of sugarcane, making it difficult to obtain desirable traits. With the emergence of gene editing and omics technologies, new opportunities have arisen for the biotechnological improvement of sugarcane crops. Gene editing techniques, such as CRISPR/Cas9, allow precise modifications of the sugarcane genome, resulting in improved traits such as disease resistance, abiotic stress tolerance, and increased yield.

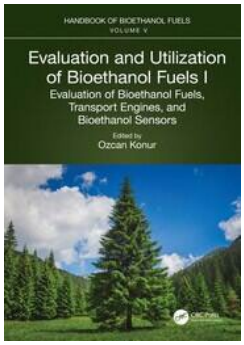


In addition, omics approaches such as genomics, transcriptomics, proteomics, and metabolomics can provide a comprehensive understanding of the molecular mechanisms underlying important traits in sugarcane, enabling the identification of key genes and pathways for targeted improvement. The combination of gene editing and omics approaches can lead to a more efficient and effective way of improving sugarcane crops. For instance, the identification of key genes and pathways through omics approaches can inform the selection of targets for gene editing, while gene editing can validate the role of identified genes and pathways. Overall, the use of gene editing and omics approaches holds great promise for the biotechnological improvement of sugarcane, leading to improved productivity, sustainability, and economic benefits for sugarcane growers and processors.

Published: November 30, 2023

> **Link**

Ethanol Fuel from Sugarcane: Present and Future Contribution to Climate Change Mitigation



Significant changes in the road transportation sector are being forecasted for the following decade due to global environmental concerns, with the leading strategy being vehicles with total or partial electrification. In this text, we discuss sugarcane ethanol relevance as part of this context and call attention to the fact that its potential has been frequently underestimated. Hybrid vehicles fed with neat ethanol or high ethanol blends can lead to greater GHG emission reduction compared with conventional and battery ones. Furthermore, due to the efficiency improvements in hybrid vehicles, and the use of the full potential of sugarcane coproducts, the land area required for their feedstock production is significantly reduced when compared with conventional cars using straight ethanol. The traditional first generation sugarcane ethanol production route already provides lower GHG emissions compared with fossil fuels, and technical improvements in bioelectricity generation and use of carbon capture and storage (CCS), both already commercially used, can enlarge this gap, making it a serious competitor with electric vehicles.

Published: December 22, 2023

> **Link**

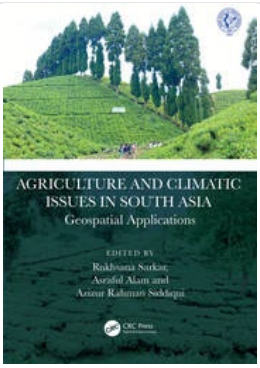
Application of Fuzzy Machine Learning Model for Mapping Diseased Sugarcane Ratoon Fields

Optimum crop mapping and monitoring solutions have been provided by combining temporal remote sensing images with machine learning approaches. Monitoring the spread and extent of crop disease is an important aspect of food security. Muzzafarnagar district in Uttar Pradesh, India, is rich in sugarcane cultivation. Sugarcane fields have varying germination processes which do not allow statistical-based machine learning algorithms to handle high levels of heterogeneity. An individual sample as a mean training method is used in this study for training the machine

learning model which considers the effect of each pixel individually and not as a statistical measure. This study utilizes a temporal indices method to map the diseased sugarcane ratoon fields with a fuzzy kernel-based modified possibilistic c-means classifier. The non-uniform spread of disease makes it challenging to map the disease-affected fields from optical satellite data. The PlanetScope DOVE (3-m) sensor dataset is utilized for this study. This study shows that the healthy and diseased sugarcane ratoon fields can be mapped using the proposed approach with mean membership difference values of the order of 0.04 and 0.02 for healthy and diseased sugarcane ratoon fields, and it aims to utilize the temporal satellite data for unique crop type identification and mapping.

Published: December 22, 2023

> **Link**



Determining morphological and biochemical indices to select for smut-resistant sugarcane varieties

In Sri Lanka, smut in sugarcane (Saccharum spp. hybrid) is caused by Sporisorium scitamineum and results in significant crop yield and economic losses. Current field evaluation methods to identify smut resistance in sugarcane are time consuming and do not show an association between disease resistance and the resistance mechanisms. This research was conducted to identify morphological and biochemical characters as selection indices of smut-resistant varieties to strengthen the existing varietal selection program. Fifty accessions were selected from the sugarcane germplasm collection and tested for their resistance to S. scitamineum by the standard inoculation method. The disease incidence and Area Under Disease Progress Curve (AUDPC) were assessed in the first two crop cycles. Pearson correlation coefficients were used to identify relationships of AUDPC with evaluated nine morphological and biochemical characteristics. Principal component analysis (PCA) was used to identify the indices associated with smut resistance and select the superior sugarcane varieties. Significant negative correlations ($P < 0.05$) were detected between AUDPC and total phenols in the leaves, bud hardness, foliage inclination angle (FIA) and number of scale leaves in the buds. The tested nine morphological and biochemical indices formed four major clusters by PCA with a cumulative contribution rate of 66%. The findings revealed that total phenols in the leaf, bud hardness, FIA and the number of scale leaves in the bud are useful, simple and non-laborious indices to determine sugarcane smut resistance in varietal selection.

Published: December 4, 2023

> **Link**



The Versatility of Mixed Lignocellulose Feedstocks for Bioethanol Production: an Experimental Study and Empirical Prediction



The development and use of renewable energy resources is a crucial solution for a sustainable energy strategy to decrease the dependence on fossil fuels. Lignocellulosic ethanol has gained recognition as a renewable energy resource vital for sustainable development. Currently, the research and industry sectors utilize a single type of lignocellulose biomass for ethanol production. However, this biomass dependency is a potential risk due to the global warming effect on biomass plantations. This study assessed the versatility of rice straw (RS), Napier grass (NG), and sugarcane bagasse (SB) as a mixed biomass for bioethanol production. The mixture of equal proportion of RS, NG, and SB in a 1:1:1 ratio produced higher concentration of bioethanol than individual biomasses. NaOH-pretreated samples were more effective than H2SO4 pretreated and untreated samples in bioethanol production. The NaOH-pretreated mixed sample yielded maximum bioethanol of 0.82% (v/v). About 0.43 g/g and 0.12 g/g of reducing sugars and ethanol, respectively, could be produced using RS, NG, and SB in the ratio of 1:1:1. This research indicates that different biomass types can replace one another in the event of limited resources, thus reducing the dependency on a particular biomass type for biorefinery.

Published: November 30, 2023

> **Link**

Towards a Greater Understanding of the Sugarcane Agro-industry Sustainability Analysis: A Tertiary Study



Sustainability has been widely studied by researchers in many sectors including sugarcane industry. Accordingly, many primary research studies have been carried out regarding various topics of sustainability analysis. Moreover, several secondary studies in the form of both systematic reviews and systematic mapping studies have been published. However, there is a need to conduct a tertiary study in this important area of research that identifies, analyzes, and classifies these individual secondary studies. A tertiary study answers wider research questions by identifying and analyzing articles by following the same methodology as systematic mapping reviews. A novel systematic literature review method is proposed and used to identify, analyze, and classify secondary research in the field of sustainability analysis in the agricultural sector. Articles were analyzed using a search protocol, including descriptive and content analysis criteria. We identified 47 secondary studies to better understand the systematic approach, database sources, sustainability assessment stages, sustainability dimensions and indicators sustainability, data analysis tools, and new concepts proliferated from the studies. We analyzed these 47 secondary studies to determine their quality, direction, scope, limitations, and key recommendations for future work in sugarcane sustainability analysis.

Title to be presented on Thursday, December 14, 2023

> **Link**

Using crop models, a decline factor, and a "multi-model" approach to estimate sugarcane yield compared to on-farm data



Sugarcane is an important crop in Brazilian agribusiness due to its diversified use. Crop forecast models are important tools for planning and making decisions regarding crop management. These models can be simple or complex, and choosing them will depend on the knowledge level of those using them. Thus, this study aimed to compare different methods for estimating sugarcane yield in three crop cycles. Data collection occurred in a sugarcane field in the municipality of Santo Antônio de Goiás, Brazil. The sugarcane variety evaluated was CTC-04. This variety was cultivated under dryland conditions, in cane plant, ratoon 1, and ratoon 2 cycles. Agrometeorological, biometric, and crop yield data were analyzed. Five crop models were used to estimate sugarcane yield: (i) FAO-Agroecological Zone (AEZ), (ii) agrometeorological-spectral (AEZs), (iii) Monteith (M), (iv) Scarpari (S), and (v) Martins and Landell (ML). Models AEZ, AEZs, M, and S showed average yield differences of about 15%, with the largest difference recorded by the ML model (39%). All models detected yield decline as a function of the number of harvests (kdec = - 0.70). The multi-model approach reduced the differences between estimated and actual values, especially for the combinations "AEZ + AEZs" and "AEZ + AEZs + M." The present findings contribute to the investigation of different models with the potential to estimate sugarcane productivity.

Published: November 29, 2023

> Link

Energy Efficiency Improvement Approaches in Sugarcane Industry: A Case Study



Sugarcane processing industry is believed to consume a high amount of energy through several production stages. Consequently, the cost of energy is considered an important item in total production costs that consuming a detectable part of the company's annual profits. Energy audit program (EAP) is considered an important pillar to mitigate the high cost production for improving the efficiency of industrial operating conditions. It improves the efficiency of the factory's components through three scenarios. The first is starting from classifying the utilities inputs and outputs to evaluate energy balance of each equipment. Results indicated that in the first scenario by using steam dairator, the fuel flow rate can be reduced by 189.49 m3/h which raise the energy efficiency by 6.32 %. In the second scenario, boiler blowdown heat exchanger only, flow rate of 166 m3/h of fuel can be saved with 5.52 % increasing in energy efficiency. In the third scenario, mixing between the two previous scenarios will increase the energy efficiency by

22.1 % via saving fuel reached about 664 m3/h. It was found that the suggestive solutions are significantly contributed remarkable improving in the company's energy efficiency. Consequently, they decrease energy cost items and increase the company's annual output profits.

Published: November 27, 2023

> **Link**

Major Insect Pests of Sugarcane (Saccharum officinarum) Crop and Their Integrated Management Approaches



Sugarcane has a fair variety of insect pests that flourish on it, and on average, these insect pests cause a 15-20% loss in yield, in addition to a decrease in produce quality (Majumder, 2020). It is accepted that half of these total insects are of new world origin, while the other half are of old world or oriental origin. In other words, approximately 650 insects visit sugarcane in the old world, to which India belongs. A larva enters the cane by a small hole in the epidermal tissues (leaf, leaf sheath, and stalk) and feeds within the tissues. Sugarcane borer infestations cause direct injury. Sugarcane borer infestations cause direct injuries owing to galleries produced along the sugarcane stems, which might lower yield and indirectly allow fungal colonisation (Pannuti et al., 2013). Furthermore, losses are exacerbated by lower sugar content and contamination of sugarcane juice, which impedes fermentation in the ethanol manufacturing process (Rossato Junior et al., 2013).

Published: November 2023

> **Link**

Automated sugarcane crop disease forecasting with colour and texture features



This paper intends to introduce a novel sugarcane plant disease prediction. There are three stages to the projected method, namely: (i) Preprocessing, (ii) Feature extraction, and (iii) Disease detection phase. Initially, the input image is given to the pre-processing stage in which the grey transformation and bilinear interpolation are carried out. The grey transformation is undergone to improve the clarity of the picture and the bilinear interpolation is used as a re-sampling technique. The feature extraction step follows the pre-processed picture, where both texture and colour features are retrieved. More specifically, the texture features like GLCM and suggested Distance-based LBP (D-LBP) features will be extracted. Subsequently, the extracted features are subjected to the disease detection phase process, where a hybrid classifier is introduced. This hybrid classifier blends the concepts of 'Neural

Network (NN) and Support Vector Machine (SVM)' for better prediction results. In order to verify the effectiveness of the work that is suggested, a comparison analysis is conducted comparing the suggested and current approaches. The proposed method achieves highest accuracy in 80% of learning which is 13.97%, 16.12%, 11.82%, and 12.9% better than the other methods such as SVM, DT, RF, and NN, respectively.

Published: November 26, 2023

> Link

Events

Carbo Solutions 25th International Sugar Conference

Carbo Solutions

24-26 January 2024

Casablanca Marriott Hotel, 100, Avenue des FAR Casablanca, Morocco

> Link

SIT Annual Technical Meeting 2024

Sugar Industry Technologists (SIT)

28 April – 1 May 2024

Vancouver, Canada

> Link

	ASSCT Annual Conference *Australian Society of Sugar Cane Technologists* **16-19 April 2024** **Townsville Entertainment and Convention Centre, Townsville, Queensland, Australia** > **Link**
	ISSCT 13th Germplasm & Breeding / 10th Molecular Biology Workshop *International Society of Sugar Cane Technologists (ISSCT) / ICAR-Sugarcane Breeding Institute, Coimbatore, India / Society for Sugarcane Research and Development (SSRD)* **8-12 July 2024** **Coimbatore, India** > **Link**
	ISSCT Agriculture Commission Workshop, Agricultural Engineering, Agronomy and Extension Sections *International Society of Sugar Cane Technologists (ISSCT) / Thailand Society of Sugar Cane Technologists (TSSCT)* **19-23 August 2024** **The Zign Hotel, Pattaya, Chonburi, Thailand** > **Link**

10th Edition Sugarex THAILAND 2024	**SugarEx Thailand** *Fireworks Exhibitions and Conferences* **12-13 September 2024** **Khonkaen International Convention & Exhibition Center (Kice), Khonkaen, Thailand** > **Link**
International Society of Sugar Cane Technologists Founded 1924	**ISSCT XIII Co-Products Workshop** *International Society of Sugar Cane Technologists / eRcane* **15-20 September 2024** **Saint-Gilles, La Réunion** > **Link**
8th IAPSIT International Sugar Conference ISC-2024 & Sugarcon 2024 *Building a Resilient and Sustainable Global Sugar & Bio-energy Industry: Transforming ASEAN Sugar Sector*	**8th IAPSIT International Sugar Conference ISC-2024 and Sugarcon 2024** *International Association of Professionals in Sugar & Integrated Technologies (IAPSIT), Society for Sugar Research & Promotion (SSRP) and International Centre for Interdisciplinary Science & Education (ICISE)* **16-19 September 2024** **International Centre for Interdisciplinary Science and Education (ICISE), Quy Nhon, Binh Dinh, Vietnam** > **Link**

International Society of Sugar Cane Technologists Founded 1924	**ISSCT XIII Pathology and XI Entomology Joint Workshop** *International Society of Sugar Cane Technologists / SATCA* **25-29 October 2024** **Salta, Argentina** > **Link**
International Society of Sugar Cane Technologists Founded 1924	**ISSCT XXXII Centennial Congress** *International Society of Sugar Cane Technologists / Asociación Colombiana de Tecnicos de la Caña de Azúcar (TECNICAÑA).* **21-31 August 2025** **Centro de Eventos Valle del Pacifico, Cali – Colombia** > **Link**